Gu Test: A Progressive Measurement Of Generic Artificial Intelligence

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Technological Singularity is baseless. Turing Test and other empirical tests are invalid. Driverless cars with no constrains (i.e. SAE level 5 automated driving) are impossible.

To verify these, we need design scientific experiments with strictly controlled conditions to test the underlying principles. Scientific conclusions can only be derived from these principles based on the conditions, which is not possible in empirical tests.

Turing test, the Go games played by AlphaGo Zero and AlphaGo Master, and the road tests of automated-driving cars, are just empirical tests, not scientific experiments, and could be severe misleading if the future mode evolution is the unstable .

In this paper, I will analysis the differences between scientific experiments and empirical tests, and some systematic problems in the popular textbook Artificial Intelligence: A Modern Approach. Then I will discuss the foundation of intelligence sciences, and propose Gu Test, a progressive measurement of generic artificial intelligence, to gradually develop scientific intelligence theories.

To understand the difference between human intelligence and artificial intelligence (AI), we need better understand the development of languages, philosophies, mathematics, and sciences, etc., and better understand commonsense, innovation, and sophism.

Without scientific testing, recent AI technologies: deep-learning, reinforcement, etc., could lead to sophism, especially in natural language processing (NLP). Sophism on academic issues could damage the foundation of education, researches, and judicial practice, etc.

1. Scientific Experiments vs. Empirical Tests

The recent accidents of automated-driving cars (some are fatal) raise some serious issues in AI theories and AI testing [1].

According to the Waymo Safety Report 2017, their driverless cars are wired with certain pre-information [2], making it difficult to adapt to some future mode evolution, especially when the mode evolution is unstable.

If the mode evolution is not stable, not only the judgment based on intuition could be wrong, the statistical results, the deep-learning of empirical data, and other AI technologies also could be severely misleading.

It is difficult, most likely impossible, to study the unstable mode evolution in future based on intuition or empirical tests .

Turing Test is also subjective, and the language complexity is much less than the human intelligence complexity. It also could not apply to many important AI applications, such as computer Go systems, driverless cars, etc.

Scientific experiments should be designed based the analyses of underlying principles and theories, so as to verify them. Such principles and theories could provide some insights into the unstable mode evolution in future, which empirical tests are blind to.

Scientific experiments should also be done under strictly controlled conditions. Conclusions can only be derived based on conditions. Without such strictly controlled conditions, the results of simulations and empirical tests could be misleading.

Currently, we still have very little knowledge about human specific intelligence, and very little knowledge about the principles and theories of human specific intelligence. So it is still difficult to design real scientific experiments with driverless cars.

However, we could select certain simpler systems, such as computer Go game systems, to experiment the technologies and principles available to these simpler systems.

The AlphaGo Zero paper on Nature presented a method learning from scratch. It claimed a superhuman performance [3]. However the paper

provided no evidence for this claim [4]. If some experiments could falsify the claim, they could illustrate the problems in existing AI technologies, and reveal certain important principles we do not know yet, which might help to study other more complex applications of AI, such as driverless cars, etc.

Also, it is much easier to isolate various factors and figure out the principles in such simpler experiments.

So I designed some experiment schemes with strictly controlled conditions to test this claim or any such implications, and to measure the intelligence in AI technologies progressively.

Regular people may spend many years before triggering destructive mode evolution in AI applications such as driverless cars. Such mode evolution could only happen in large-scale usages. Once triggered, such mode evolution could happen frequently later [5].

So studying simpler experiments such as computer Go game systems could help to avoid large scale disasters in potential [6].

Go gaming is strictly defined within a very small and limited space. Industrial automations are typically designed in well controlled environments, but not strictly defined. Car driving is regulated, but the environment is not well controlled.

To design scientific experiments with AI, first we need clarify certain confusions.

2. The Problems in AI: A Modern Approach

There are problems in the both philosophical foundations and test theories in the 3rd edition of popular textbook AI: A Modern Approach.

The textbook does not distinguish the difference between empirical tests and scientific experiments. By so-called "wind tunnel" approach, the book actually took empirical tests for AI without mentioning the scientific principles and theories which should be behind the tests. This causes problems in practice, especially if the future mode evolution is unstable.

Newton and George Cayley illustrated the principles of forces and forces of flight long before Wright brother built their planes. If Wright brothers were still with Aristotle's wrong concept of forces, "wind tunnel" approach would not work for them.

The 3rd edition deleted the introduction of Socrates and Plato in the Philosophy section of The Foundations of Artificial Intelligence which were presented in the first edition without paying attention to that Galileo actually set Socratic method and experiments as the foundation of sciences in his book Dialogue Concerning the Two Chief World Systems.

The 3rd edition took Aristotle philosophy as the rational mind by mistake: "Aristotle... was the first to formulate a precise set of laws governing the rational part of the mind."(page 5)

In Dialogue Concerning the Two Chief World Systems, Galileo actually indicated that Aristotle philosophy cannot express scientific methods, and is not rational in sciences.

Immanuel Kant studied epistemology and critique. Aristotle philosophy even cannot express epistemology and critique, and cannot explain the rationale in philosophy.

Gödel's theorems showed the problems of logic. Gödel's studies indicated Aristotle philosophy cannot completely express the rationale in mathematics.

Aristotle philosophy cannot express the rationale in philosophy, mathematics, and sciences. So it could not "formulate a precise set of laws governing the rational part of the mind".

Logic is actually a primeval method in philosophy, which could detect certain problems in languages. Aristotle developed logic to prevent sophistry. However, the new studies in 20th century discovered that there are problems in logic itself, which could not really clear sophism, and could even cause other problems.

AI and artificial neural networks, including ResNet and its variant, Generative Adversarial Networks, Capsule networks, etc., could not get rid of the main problems of Aristotle philosophy at many key points in their flow processes. The testing problems for artificial neural networks actually could even be worse. One reason is: sophism could be out of control in them.

To design good experiments, is to figure out some critical points in

experimental spaces, so that new theories could be established based on small amount of experiment results, and other possibilities could be falsified, which is different from the methodolgy of big data technologies. Big data technologies also could not analysis the unstable mode evolution in future.

To understand the difference between human intelligence and artificial intelligence, we need better understand commonsense, innovation, sophism, and better understand the development of scientific concepts, principles, and theories, and design better experiments with them.

3. The Foundation of Intelligence Sciences

Intelligence sciences are to develop scientific concepts, principles, and theories of intelligence (especially human specific intelligence) based on experiments and other scientific methods.

Sciences originated from philosophies and introduced mathematics gradually. Scientific philosophies could not only provide insights and conjectures for theories and experiments, but also assure the validity of experiment results and the correctness of result interpretation.

To figure out the critical points in experiment spaces, we need better languages to describe and distinguish them, including new concepts in natural languages and new mathematics forms.

Gödel theorems suggest mathematics cannot judge the correctness in sciences. Turing Machine has limitations. Universal approximation does not exist on Turing Machine. Computers, including quantum computers, have systematic problems to process high-order logic and recognize sophism, etc. So intelligence sciences are different from mathematics and computer engineering.

Progresses from neurosciences are mainly at physiological level or animal level, such as in vision, audio, motion, emotion, etc. Nothing could illustrate the human specific intelligence so far. Life develops over the entropy law. Intelligence is quite different from energy. So intelligence sciences are also

different from biology and physical sciences .

Intelligence sciences are new fields, requesting new concepts, principles and theories, etc. A good approach is to start with a cross studying of languages, philosophies, mathematics, and sciences. etc. These are typical human specific intelligence, with good principles.

Irrational numbers and the first mathematical crisis caused fundamental transition of human intelligence. Soon after that, sophism appeared as a destructive force to philosophy, and even to civilizations. The implications of these to human intelligence should be studied.

To develop these studies into sciences, we need design experiments with strictly-controlled conditions, to test various concepts, principles, and theories, etc.

4. Gu Test

To avoid the problems in empirical tests, and develop scientific foundation for intelligence studies, I take two steps: first, discover the problems in AI technologies and the fundamental principles of intelligence; second, study what conditions could triger unstable mode evolutions and significantly increase the probabilities of these AI problems to dangerous levels [7].

For these purposes, I am designing a procedure to progressively measure the level of human specific intelligence in AI technologies [8] and discover their problems based on their falsifiability, also to test my intelligence theories and illustrate the important issues and principles missed by current studies [9]:

1) A 4-dimension experiment space to test the intelligence of computer Go systems in Go games and discover the problems in the AI technologies used by these systems, especially to test AlphaGo Zero's superhuman claim or any such implications [10].

Since there is only one opportunity to gather certain important experiment results before computer Go systems could be adjusted by humans, the first round experiment should be done on the strongest Computer Go system

with large-scale experiments [11].

I choice to start experiments with computer Go systems, because some important factors could be well isolated in such simpler systems.

2) Research and experiment schemes for languages, to study the expressing power and limitations of various languages, including natural languages, mathematics, music, etc., to study the personalities, intelligence, and mode transitions behind the language expressing [12].

For NLP, the studies include the development of commonsense, concepts, principles, theories, philosophies, etc., in natural languages, and also include processing high-order logic, recognizing sophism, verifying Chinese room issues, etc.

Even if NLP could solve many problems, among the remaining ones there are critical problems which could mislead people and impede the development of human intelligence, and damage the foundation of education, researches, and judicial practice [13], etc.

3) Plans to study the relations between brains, mind, and human specific intelligence, and do certain experiments. The experiments will not be related to human. Current progresses in neurosciences are mainly at physiological or animal level, such as on vision, audio, motion, emotion, etc., which does not illustrate the essentials of human specific intelligence.

The plans for brain and intelligence studies are: First, do a survey of current brain researches. Then develop certain experiment plans with some brain experts based on the survey and my theories. The experiments could be done by some selected brain experts.

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These studies and experiments require certain amount of resources. They are all fundamental researches for peaceful purposes with no profit prospect.

They are scientific researches of the concepts, principles, theories, philosophies of intelligence, rather than personal or social tactics or maneuvers, etc.

Scientific disputes can only be resolved by experiments with strictly

controlled conditions. No person could play the role of judge in sciences. Questions and negations to my opinions should be subject to open discussions and strict experiments before conclusions being made.

5. Future

The studies and experiments could be extended to other AI technologies and systems, and other aspects of human specific intelligence, etc., in future.

I study these critical problems for the welfare of all humans. However, various attacks and threats to my properties and life happened again and again. I cannot do further researches unless in safe personally and economically. Some health degrading could be irreversible.

Sophism, misleading, and wrong interpretation of technologies and empirical test results, could damage scientific researches in future.

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[1] According to news, in 2015 a blind man was allowed to take a driverless car alone, before the accident on 02/14/2016. Although the damage of this accident is minor, wrong judgment of driverless cars is very dangerous potentially.

https://www.washingtonpost.com/local/trafficandcommuting/blind-man-sets-out-alone-in-googles-driverless-car/2016/12/13/f523ef42-c13d-11e6-8422-eac61c0ef74d_story.html, https://www.marketwatch.com/story/google-says-driverless-cars-are-ready-to-make-money-but-we-wont-know-if-they-do-2016-12-13.

[2] https://waymo.com/safety/.

[3] https://www.nature.com/articles/nature24270.

[4] Superhuman is a concept related to generic human. AlphaGo Zero defeating AlphoGo Master is not an evidence of superhuman. Computer Go systems defeating some human players who still do not know the limitations of computers and AI is not an evidence of superior to generic human. Humans and AI have very different strengths and weaknesses.

After the propagation for Technological Singularity, driverless cars, and AlphaGo Zero from high-tech industries, such a superhuman claim could give a wrong impression that these AI technologies have the potential to exceed generic human intelligence.

Gu Test is to verify that AlphaGo Zero does not have generic human intelligence even in Go gaming. Since Deepmind does not respond to my experiment requests, people should be more cautious and meticulous about AI technologies when compared with humans.

[5] The technologies for traditional automobiles, such as electronics, powertrain, and other mechanics, etc. are based on concrete sciences whose principles are already well tested in sciences. However, AI for automated driving is empirical, with no scientific foundation. It could be very unstable in future mode evolution. So testing automated driving vehicles in a similar way to testing traditional vehicles is very misleading.

[6] The definition of SAE level 5 automated driving is simple and clear (although it is impossible) because the definition for all situations is independent of any unstable mode evolution in future.

However, due to lack of understanding about intelligence principles and AI technology problems, both the definition and testing of SAE level 3 and 4 automated driving could be severe misleading, especially when handling the unstable mode evolution in future.

The conclusion of SAE level 5 automated driving could be derived from my theories and verified by Gu Test. Gu Test starts with simpler systems: computer Go, to find the problems in AI technologies, and study the principles and mode evolutions of intelligence. Without such knowledge, making conclusions of SAE level 3 and 4 is very dangerous.

[7] Based on the first step, I only can make conclusion of SAE level 5 automated driving. My purpose is to develop the principles and theories of intelligence sciences. I do not have any plans to study automated driving in future.

[8] Gu Test does not intend to distinguish humans from humans. It only measures the difference between generic human and machines, or between

generic human and other animals.

[9] Scientific disputes should be solved by open discussions and experiments. Peer review is not enough. Open discussions could clarify some misunderstandings in peer review. Sciences should always be open to new experiments which could lead to new discoveries.

For issues related to my papers, people should not make conclusions without open discussions and without real scientific experiments.

[10] The propagation from the leader of Deepmind actually shows his understandings of intuition, human intelligence, and Go game are wrong. Parts of my experiment plans are related to testing these wrong understandings.

[11] In my article "□□□□□□□□ -- □□□□□□□□□□□□", I analyzed some problems of AlphaGo Zero, Big Data and Brain Initiative plan in more details, and proposed a management procedure to test AI, to reduce the risks of possible biases and compromising. The procedure for AlphaGo Zero asks Google to submit all the necessary resources (hardware, sofware, other data or files, etc.) to Library of Congress, so later tests could get the correct versions of resourses.

Once Google submits all the necessary resources to Library of Congress, I could also submit my experiment plans to US Congress, if US government protects my safety.

I choose Library of Congress because the experiments could help US Congress to understand some very important trends in sciences and technologies, and make better decisions.

Providing experiment facilities to clarify the misleadings in the studies of brain, intelligence, language processing, automated driving, and other AI technologies, etc., is also an important public service, a typical government function.

Other serious researchers could use the service first to experiment with AlphaGo Zero to find its problems and falsify its claims. If no others can, it is time to try my experiment plans.

[12] For an example, in The Language Instinct (2007 edition, page 221-223), Steven Pinker referred an obscure dialogue among Richard Nixon and his assistants. For scientific researches, although the dialogue is difficult to understand, it is more important to discover the principles of personalities,

intelligence, and mode transitions, etc., behind language phenomena.

[13] Humans have very different strengths and weaknesses from computers. So measuring AI systems with exams designed for humans could be very misleading. When machine translation becomes better and better, Chinese room also becomes a real issue to verify.